

London JF, Epstein FH, Kellman P, Wassmuth R, Arai AE, *Exercise Cardiac Stress Testing Using Real-Time MRI*, In: Proc of RSNA Scientific Assembly and Annual Meeting, 2000. Chicago, Il. p 240.

PURPOSE: We hypothesized that real-time MRI could be used to image cardiac function during peak physiologic stress.

METHOD/MATERIALS: Ten healthy volunteers (6 male, 4 female, aged 32 ± 6) were studied in a 1.5 T MRI scanner using an MRI compatible ergometer. Seven short axis cine imaging planes were acquired at rest and within 29 ± 6 seconds after stress using real-time FGRE-ET with UNFOLD. The scan duration for each image was 31 milliseconds. Ejection fraction (EF), ejection rate (ER), and percent systolic wall thickening (%SWT) were measured at rest and stress.

RESULTS: The average heart rate increased from 61 ± 8 to 154 ± 16 bpm with exercise. Systolic blood pressure increased from 126 ± 13 to 163 ± 13 mm Hg ($p<0.0001$). The rate pressure product increased from $7,675\pm 1,536$ to $25,070\pm 3,364$ bpm x mm Hg ($p<0.0001$). EF increased from 72 ± 6 to 85 ± 8 % ($p<0.0001$). ER increased from 249 ± 66 to 429 ± 89 ml/s ($p<0.0001$). %SWT increased from 101 ± 23 to 138 ± 19 % ($p<0.0001$).

CONCLUSIONS: Real-time MRI allowed the quantitative assessment of global and regional systolic function during a high level of physiologic stress and showed significant increases compared to resting values.